# Assessing the Value of Current Movement Pathways of Florida Panthers that Intersect Keri and Corkscrew Roads: Identifying Location and Need for Safe Crossing Measures

## Final Report


**Presented to –**

**Florida Wildlife Federation**

**Principal Investigator –**

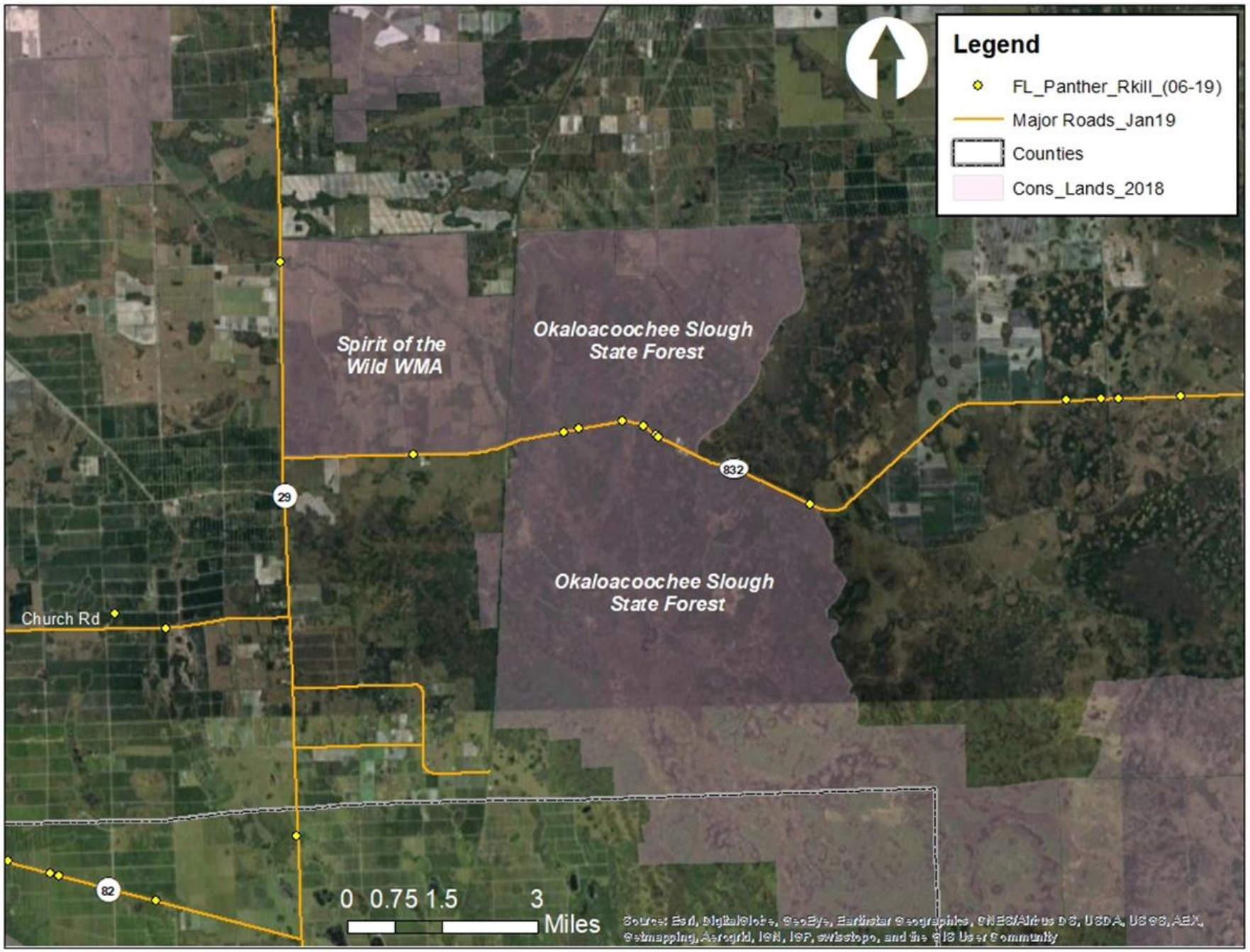
**Daniel J. Smith, Ph.D., A.I.C.P.**
**Department of Biology**
**University of Central Florida**
**Orlando, FL 32816**

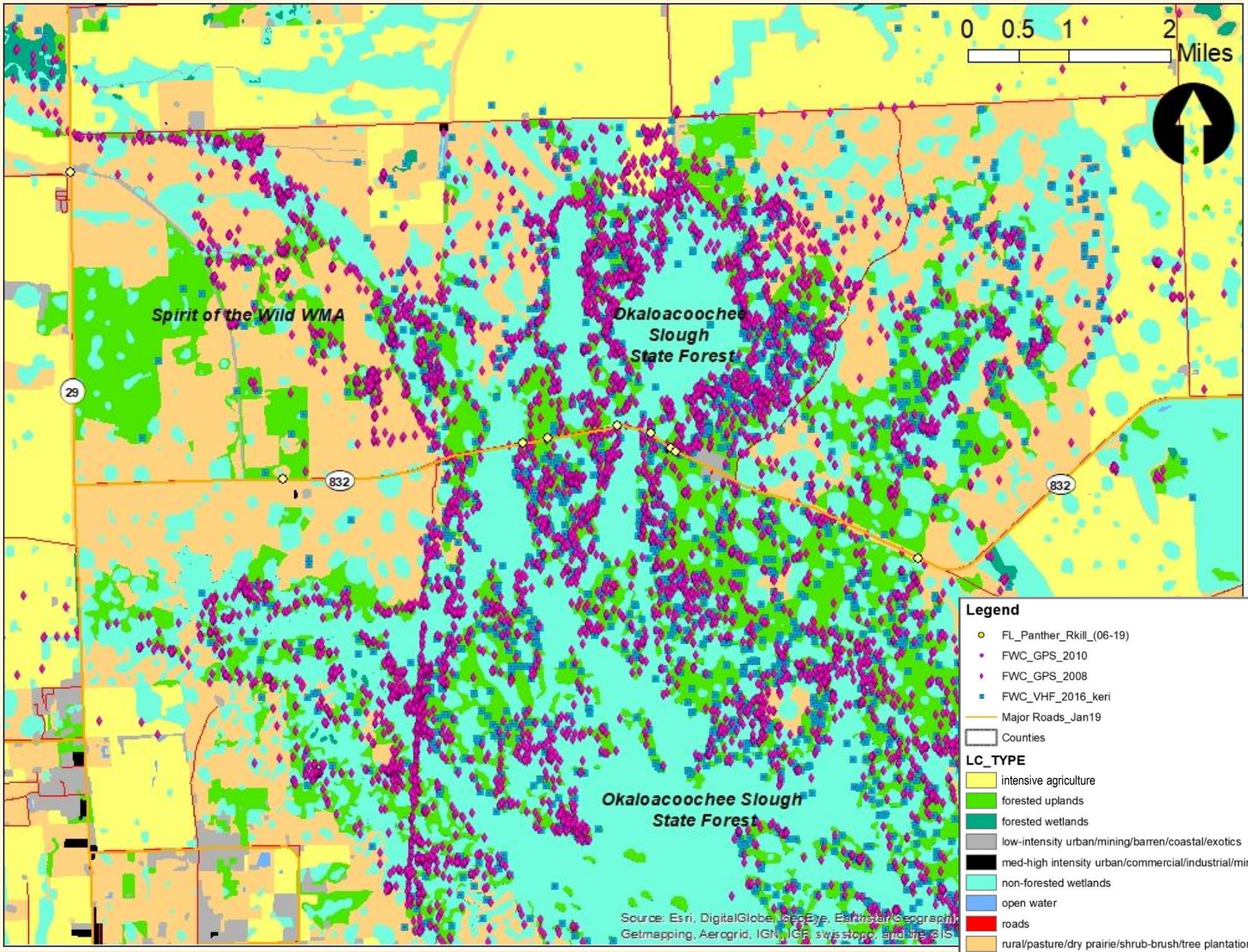
**June 30, 2019**
**July 22, 2019 (revised)**
**August 19, 2019 (revised)**

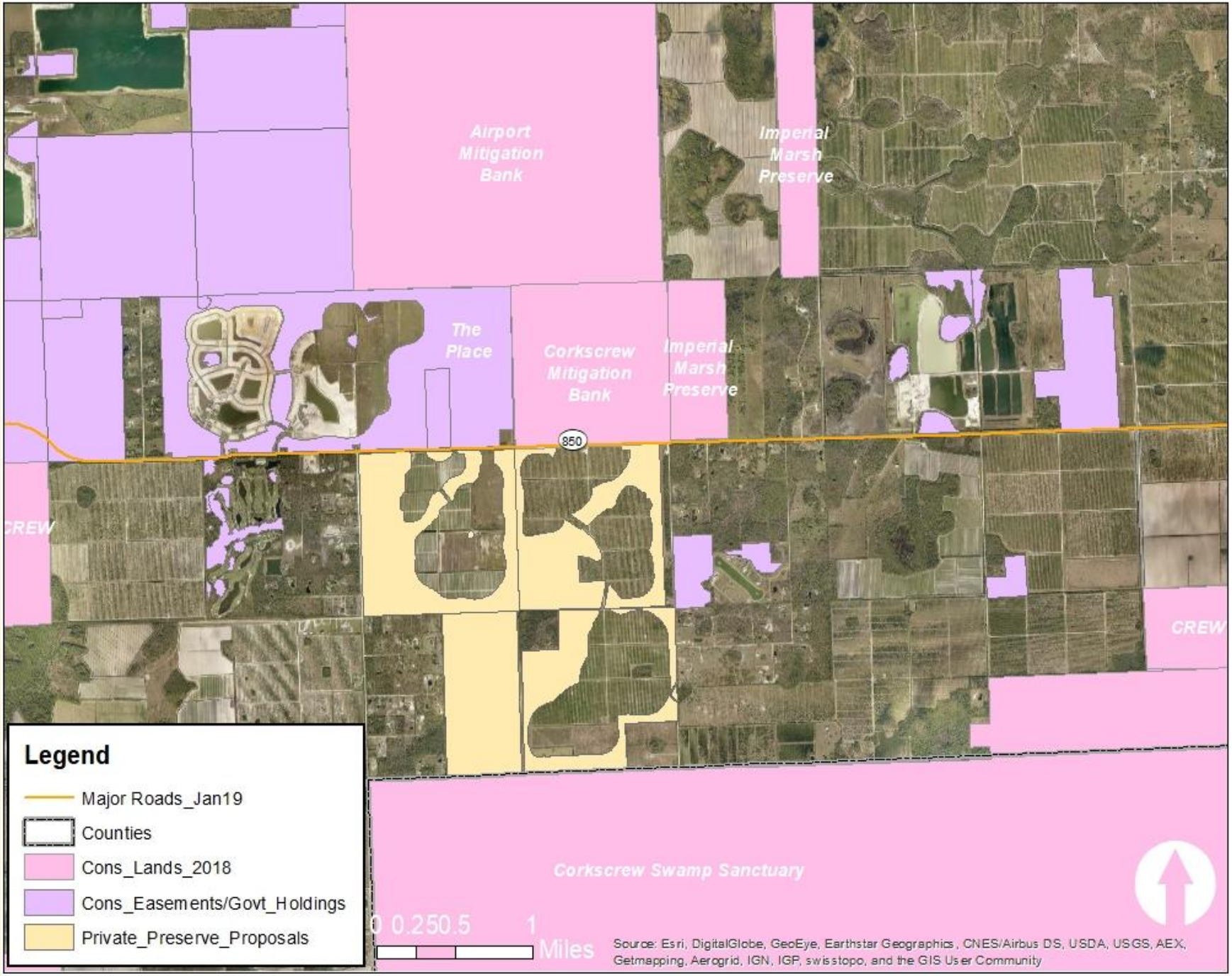
# Assessing the Value of Current Movement Pathways of Florida Panthers that Intersect Keri and Corkscrew Roads: Identifying Location and Need for Safe Crossing Measures

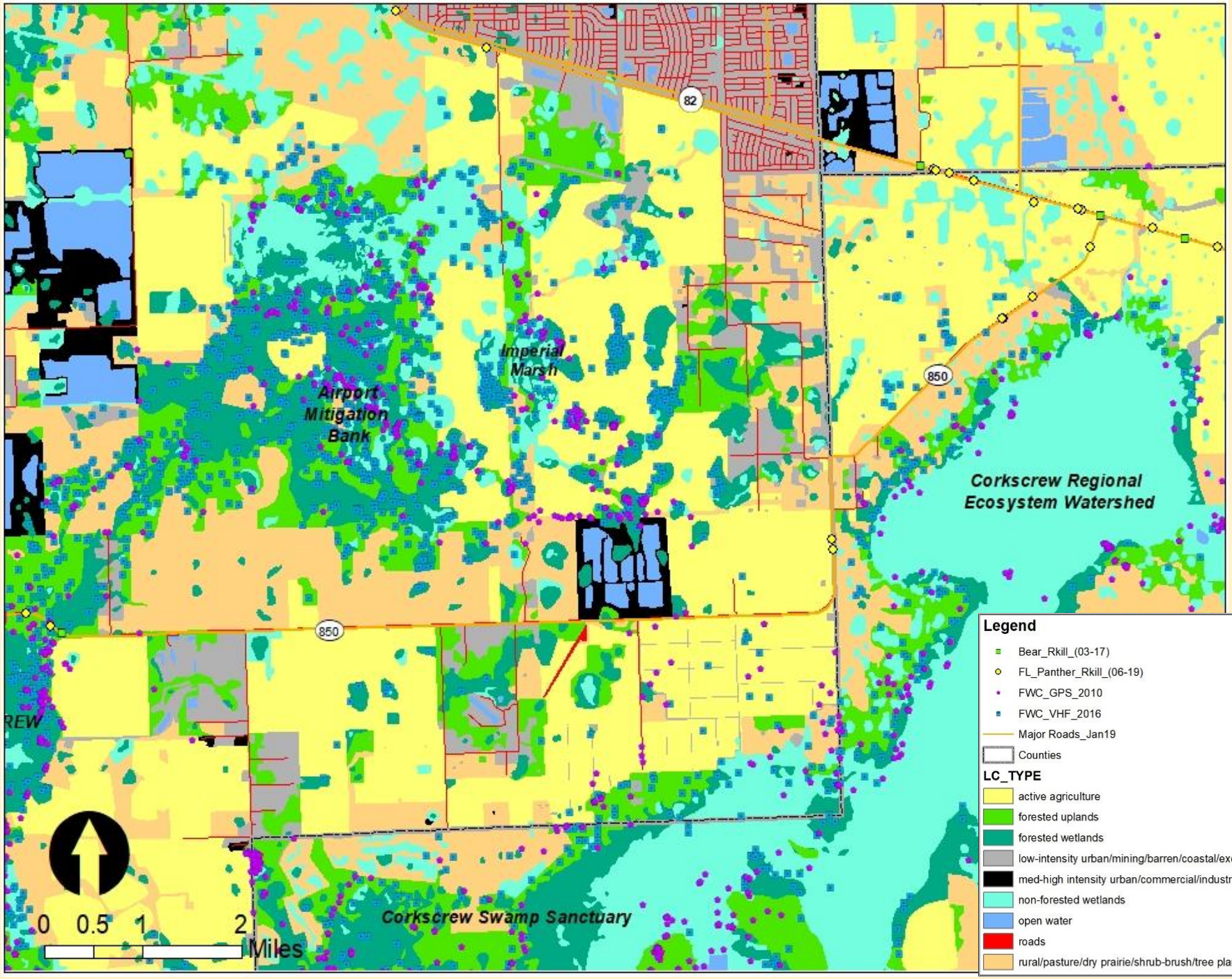
This study examined movement patterns and potential road crossing locations of Florida panthers and other wildlife on two county roads that subdivide important panther habitat areas and exhibit multiple panther-vehicle collisions/telemetry locations:

- Keri Road (Hendry County Rd 832)
- Corkscrew Road (Collier/Lee County Rd 850)


Legend
FL_Panther_Rkill_(06-19)
Major Roads_Jan19
Counties
Cons_Lands_2018
Spirit of the Wild WMA
Okaloacoochee Slough State Forest
Okaloacoochee Slough State Forest
832
29
Church Rd
82
0 0.75 1.5 3
Miles

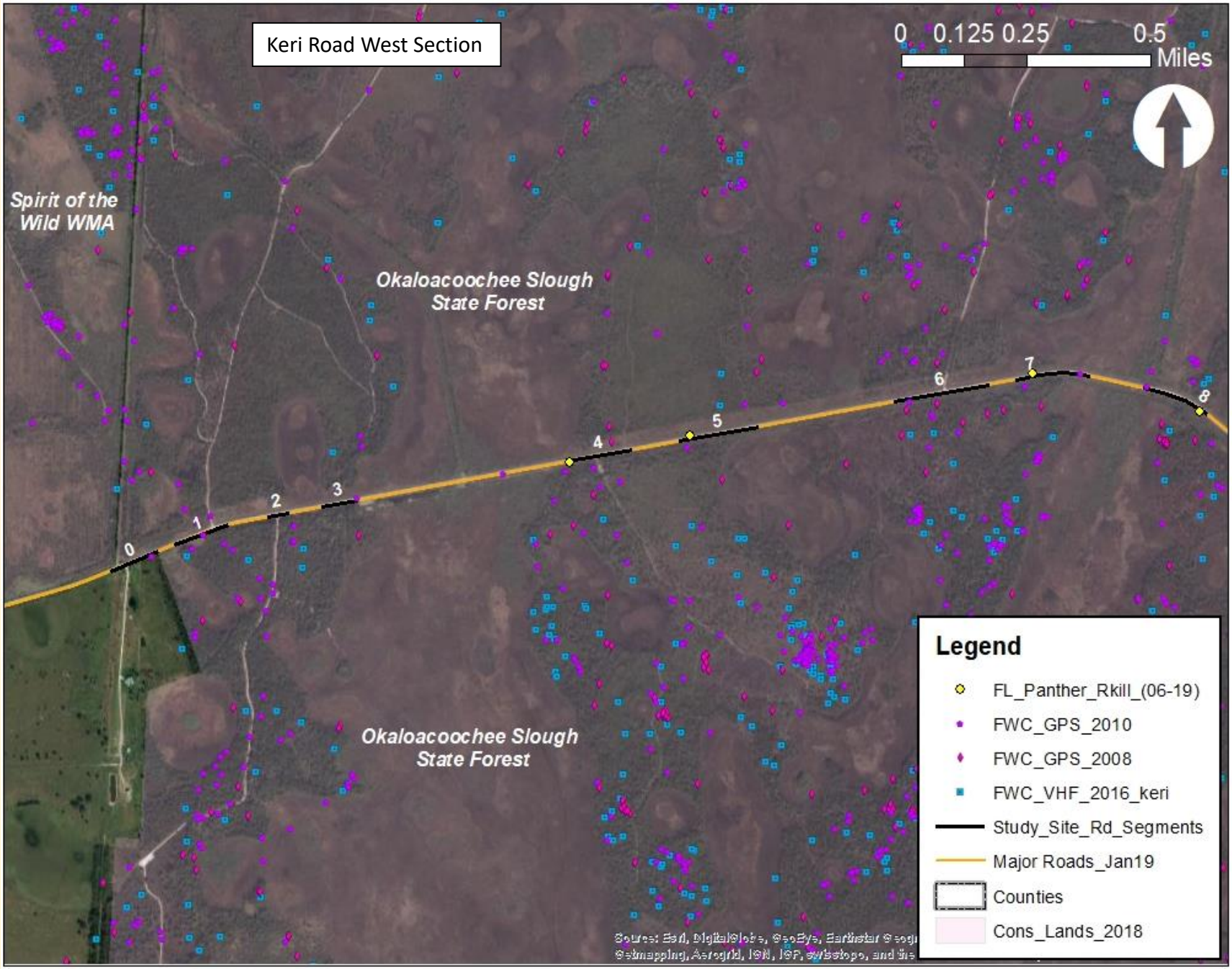

0 0.5 1 2 Miles
Spirit of the Wild WMA
Okaloacoochee Slough State Forest
Okaloacoochee Slough State Forest
29
832
832
Legend
FL_Panther_Rkill_(06-19)
FWC_GPS_2010
FWC_GPS_2008
FWC_VHF_2016_keri
Major Roads_Jan19
Counties
LC_TYPE
intensive agriculture
forested uplands
forested wetlands
low-intensity urban/mining/barren/coastal/exotics
med-high intensity urban/commercial/industrial/mining
non-forested wetlands
open water
roads
rural/pasture/dry prairie/shrub-brush/tree plantations

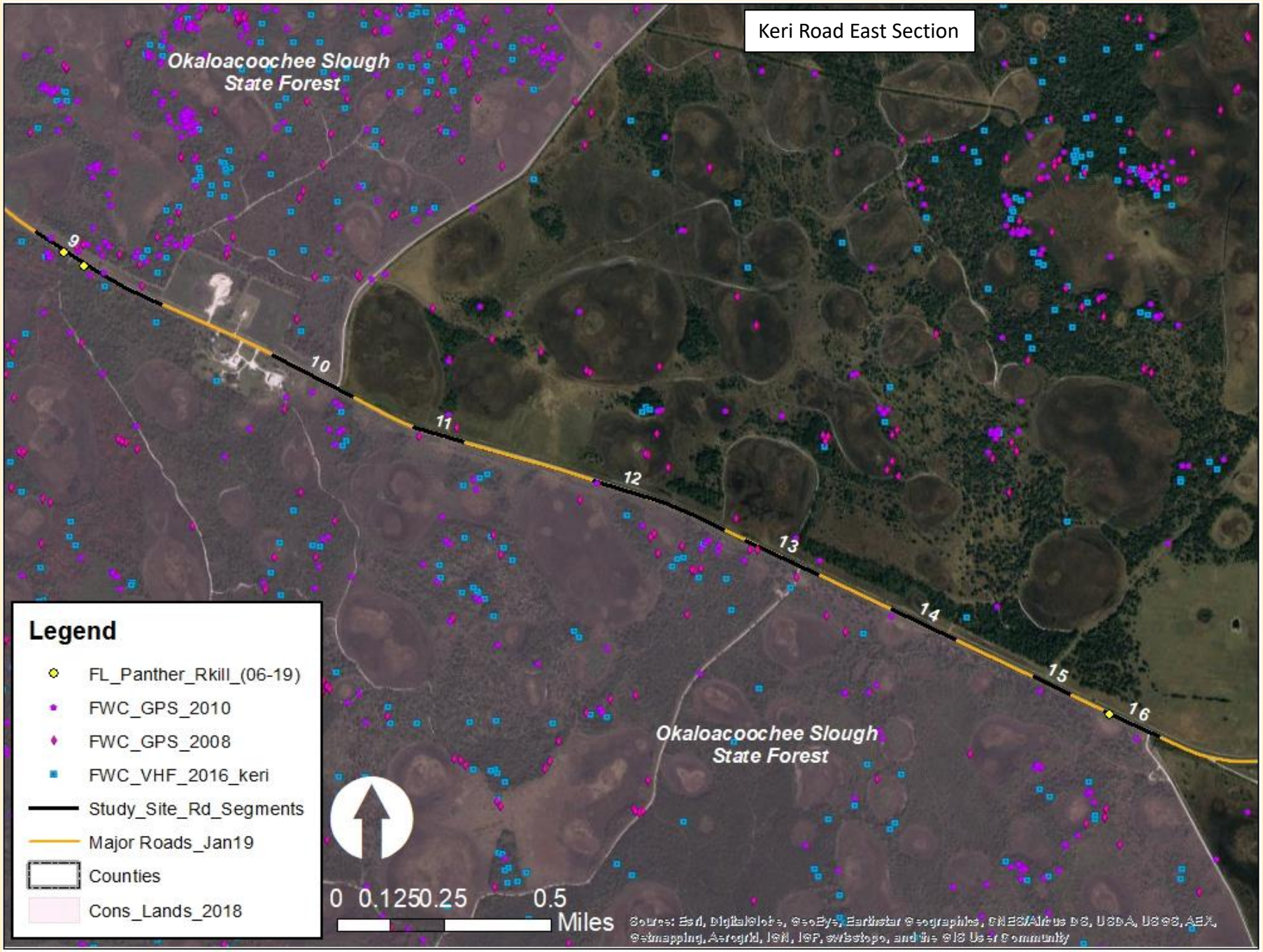

Airport Mitigation Bank
Imperial Marsh Preserve
The Place
Corkscrew Mitigation Bank
Imperial Marsh Preserve
850
CREW
CREW
Corkscrew Swamp Sanctuary
Legend
Major Roads_Jan19
Counties
Cons_Lands_2018
Cons_Easements/Govt_Holdings
Private_Preserve_Proposals
0 0.250.5 1
Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

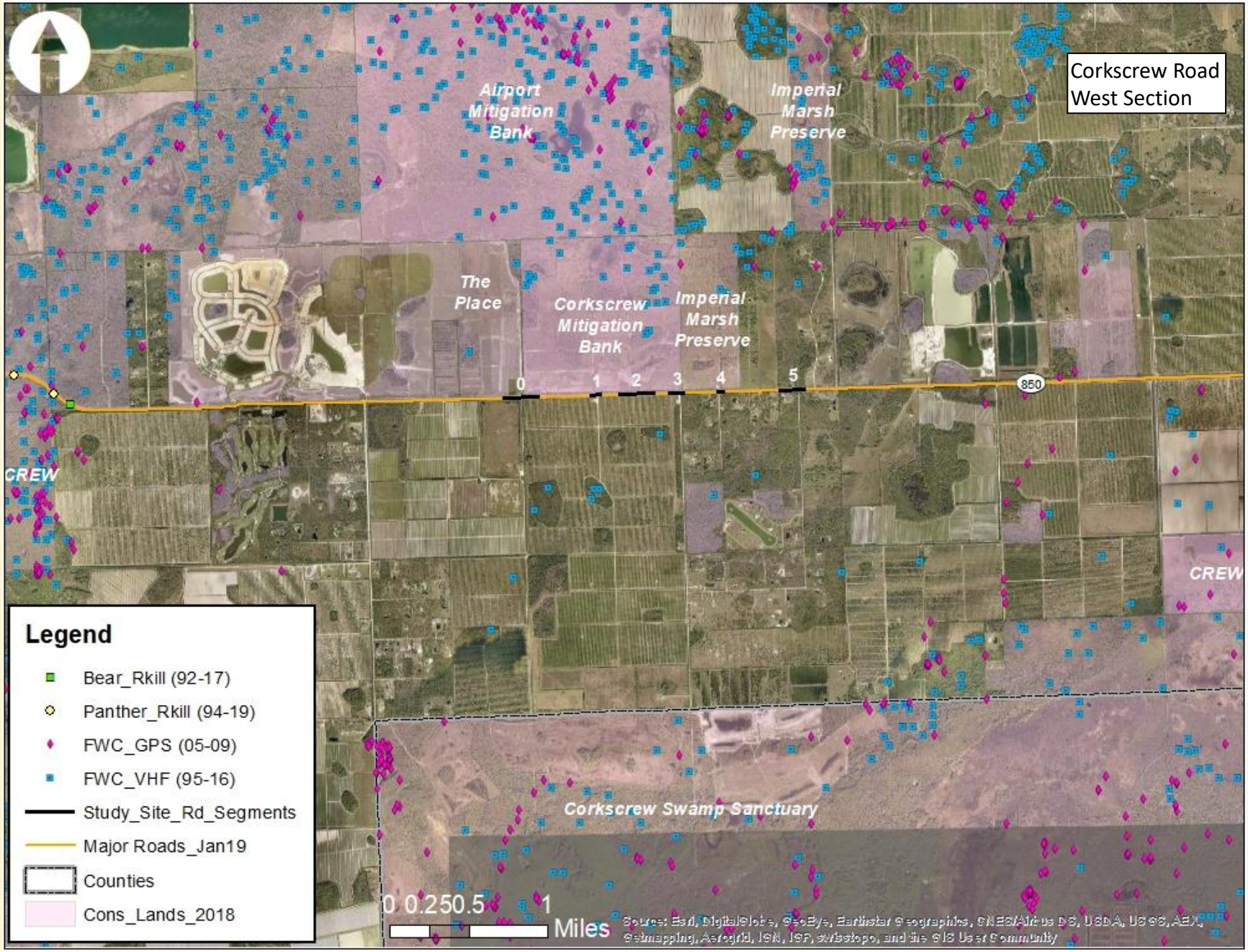

82
850
850
Imperial Marsh
Airport Mitigation Bank
Corkscrew Regional Ecosystem Watershed
Corkscrew Swamp Sanctuary
0 0.5 1 2
Miles
Legend
Bear_Rkill_(03-17)
FL_Panther_Rkill_(06-19)
FWC_GPS_2010
FWC_VHF_2016
Major Roads_Jan19
Counties
LC_TYPE
active agriculture
forested uplands
forested wetlands
low-intensity urban/mining/barren/coastal/exotics
med-high intensity urban/commercial/industrial/mining
non-forested wetlands
open water
roads
rural/pasture/dry prairie/shrub-brush/tree plantations

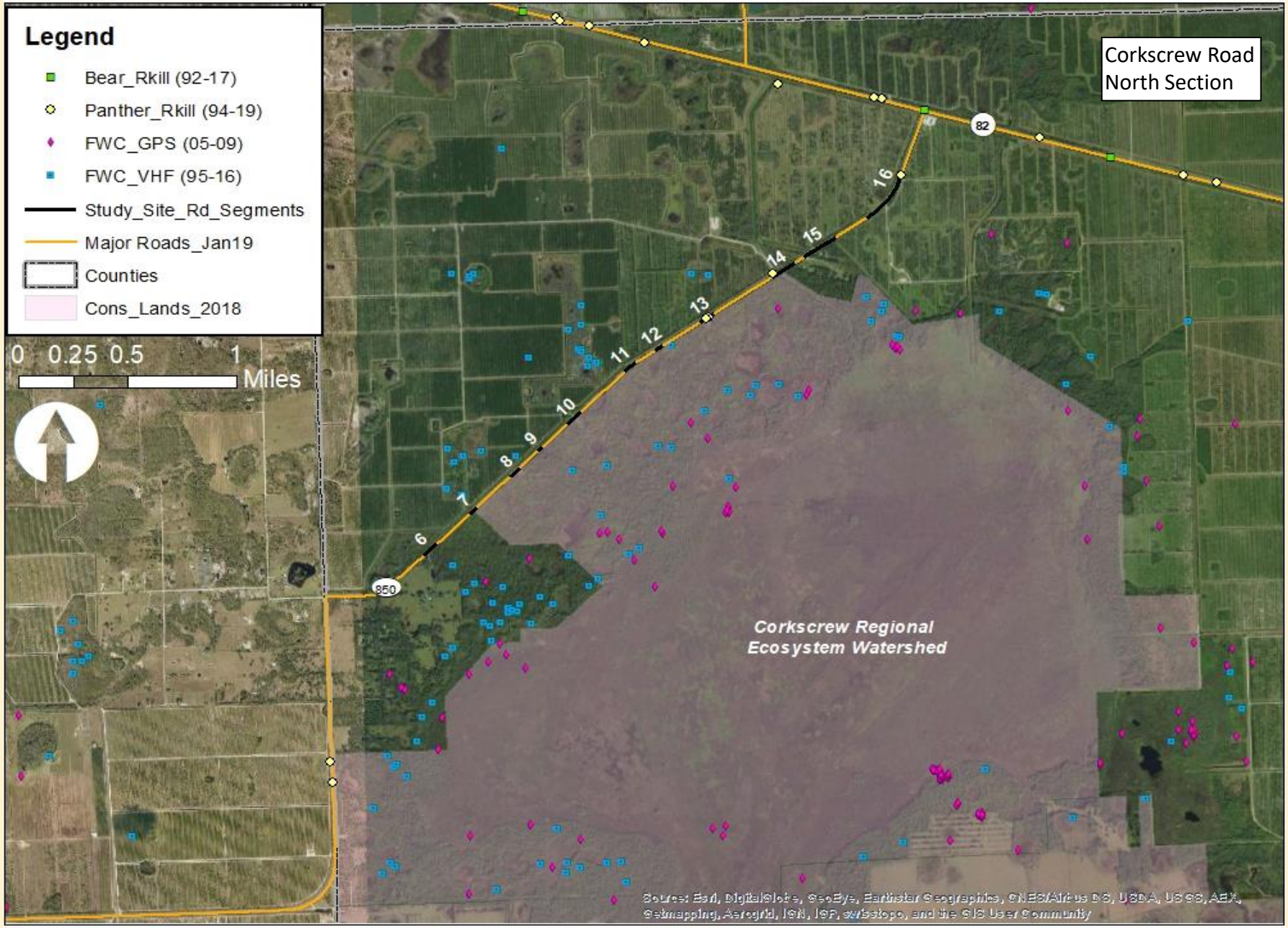
# Methods

- We deployed a total of 99 cameras along 29 road segments on Keri and Corkscrew roads at locations where either recorded telemetry, road-kill, or existing large animal trails were found
- Photo event count data (for target species: FL panther, black bear, bobcat, and whitetail deer) were assessed using R by fitting an N- mixture model using the package “unmarked” which fits hierarchical models to models of measures of wildlife occurrence and abundance


Keri Road West Section
0 0.125 0.25 0.5
Miles
Spirit of the Wild WMA
Okaloacoochee Slough State Forest
Okaloacoochee Slough State Forest
0
1
2
3
4
5
6
7
8
Legend
FL_Panther_Rkill_(06-19)
FWC_GPS_2010
FWC_GPS_2008
FWC_VHF_2016_keri
Study_Site_Rd_Segments
Major Roads_Jan19
Counties
Cons_Lands_2018


Keri Road East Section
Okaloacoochee Slough State Forest
9
10
11
12
13
14
15
16
Okaloacoochee Slough State Forest
Legend
FL_Panther_Rkill_(06-19)
FWC_GPS_2010
FWC_GPS_2008
FWC_VHF_2016_keri
Study_Site_Rd_Segments
Major Roads_Jan19
Counties
Cons_Lands_2018
0 0.125 0.25 0.5
Miles


Corkscrew Road
West Section
Airport
Mitigation
Bank
Imperial
Marsh
Preserve
The
Place
Corkscrew
Mitigation
Bank
Imperial
Marsh
Preserve
0 1 2 3 4 5
850
CREW
CREW
Corkscrew Swamp Sanctuary
Legend
Bear_Rkill (92-17)
Panther_Rkill (94-19)
FWC_GPS (05-09)
FWC_VHF (95-16)
Study_Site_Rd_Segments
Major Roads_Jan19
Counties
Cons_Lands_2018
0 0.250.5 1
Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Legend
Bear_Rkill (92-17)
Panther_Rkill (94-19)
FWC_GPS (05-09)
FWC_VHF (95-16)
Study_Site_Rd_Segments
Major Roads_Jan19
Counties
Cons_Lands_2018
0 0.25 0.5 1
Miles
Corkscrew Road
North Section
82
16
15
14
13
12
11
10
9
8
7
6
850
Corkscrew Regional
Ecosystem Watershed
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

# Results

- We recorded a total of 6,199 and 2,259 photo events of wildlife adjacent to Keri and Corkscrew roads, respectively between December 2017 and May 2019
- The number of active camera days at each site was a significant factor in the detection process and affected relative abundance estimates
- Eight state process covariates (4 numerical and 4 categorical) were also evaluated: access roads, adjacent canals, land cover, native shrub/tall grass cover, foot/bicycle/vehicle traffic, % tree cover, clear zone width, distance from camera cluster to road centerline

# Results (continued)

- road segments on Keri Road where the target species were most abundant (in relative terms only) as measured by Bayesian posterior abundance estimates differed
- abundance estimates for:
  - FL panthers and bobcats were highest in road segments 1, 4 and 9
  - black bear abundance was greatest in road segments 0, 1 and 4
  - whitetail deer were highest in road segments 2, 3, and 10

# Results (continued)

- On Corkscrew Road, the top two measures of relative abundance for:
  - panthers and bobcats were both associated with road segments 11 and 14
  - Black bears were highest in road segment 14
  - Deer were most abundant in road segments 9, 10 and 12

# Discussion and Recommendations

- need and type of mitigation to address wildlife-vehicle conflicts were presented for each individual road segment for both Keri and Corkscrew roads
- Types of mitigation included:
  - lighted warning signage with enhanced speed enforcement,
  - wildlife fencing,
  - canal dry crossings
  - “crosswalk” animal detection/warning systems
  - wildlife underpasses


30/2018 10:47PM ALICO S2C1


/2018 10:47PM ALICO S2C1


30.15 inHg - 71°F 05/30/2018 10:47PM ALICO S2C1